

## **E11: ENGINEERED SYSTEMS AND SUSTAINABILITY**

COURSE SYLLABUS (NOVEMBER 29<sup>TH</sup>, 2006)

<b>INSTRUCTOR:</b>	Dr. Eric Masanet Lawrence Berkeley National Lab Phone: 510.486.6794 Email: <a href="mailto:ermasanet@lbl.gov">ermasanet@lbl.gov</a>	<b>OFFICE HOURS:</b>	M 12:30-2:30 p.m. 624 Davis Hall
<b>GSI:</b>	Sebastien Humbert <a href="mailto:sebastien_humbert@berkeley.edu">sebastien_humbert@berkeley.edu</a>	<b>OFFICE HOURS:</b>	Tu 9:00-11:00 a.m. 624 Davis Hall
<b>LECTURE:</b>	MW 11-12 2 LeConte Hall	<b>LAB:</b>	F 11-12 2 LeConte Hall
<b>TEXTBOOK:</b>	The required textbook for this course is: Rubin, E. S. (2001). <i>Introduction to Engineering and the Environment</i> , McGraw-Hill, New York, NY.		

**COURSE WEBSITE:** <https://ospace.berkeley.edu/portal> (Sign in and join E 11.)

**COURSE OBJECTIVE:** Regardless of the field of engineering that you choose as a career, you will need to consider the impacts of your work on the environment. The goals of this course are to introduce you to a range of current environmental issues, to explore how these issues are connected to engineering decisions, and to learn about concepts and methods for analyzing the sustainability of engineered systems. We will use basic science, math, and “engineering judgment” to understand important environmental problems and develop quantitative skills to analyze them. We will also learn about many exciting and creative approaches for reducing the impacts of human societies on the environment.

**LABORATORY:** Laboratory sessions will be used for field trips, supplemental lectures and/or video presentations, the midterm exam, and exam reviews. **Six laboratory sessions** are planned for this semester (including the midterm exam). The laboratory session is mandatory—you will not pass this class if you miss more than one laboratory session. Two of the planned laboratory sessions are field trips, during which we will visit real-world engineering projects. **Scheduled laboratory sessions are listed in bold in the weekly outline below.**

**HOMEWORK:** Homework will typically be assigned on Wednesdays and will be due the following Wednesday *at the beginning of lecture*. Late homework will be docked 25% for each 24-hour period after it is due. To learn the material from this course, and to do well on the exams, it is absolutely essential that you understand the homework problems. After the homework is returned, you should go over the solutions, figure out your errors, and rework any problems that you got wrong. Working together on homework is fine, but you should first try to solve all the problems on your own. You may not copy solutions from each other. **Homework due dates are listed in the weekly outline below.**

<b>GRADING:</b>	Homework	25%
	Laboratory	5%
	Midterm exam	30%
	Final exam	40%

**ACCOMMODATION OF SPECIAL CIRCUMSTANCES:** Please see the instructor for accommodation of religious beliefs, disabilities, and other special circumstances.

**WEEKLY OUTLINE**

Week	Day	Date	Topic	Reading Assignment	Homework
1	Mon	Aug 28	Course introduction – What is sustainability?	Rubin Ch. 1	
	Wed	Aug 30	Overview of environmental impacts	Rubin 2.1-2.2	
2	Mon	Sept 4	No lecture (Labor Day)		
	Wed	Sept 6	Overview of environmental impacts	Rubin 15.4	
3	Mon	Sept 11	Natural resources I	Rubin 2.7	
	Wed	Sept 13	Natural resources II	Rubin 2.8	HW 1 due
4	Mon	Sept 18	Life-cycle assessment (LCA) I	Rubin 7.1-7.3	
	Wed	Sept 20	LCA II		
5	Mon	Sept 25	Life-cycle impact assessment	Rubin 7.4-7.5	
	Wed	Sept 27	Fossil fuels and electricity generation I	Rubin 5.1-5.4	HW 2 due
6	Mon	Oct 2	Fossil fuels and electricity generation II	Rubin 5.5-5.6.1; 2.6	
	Wed	Oct 4	Renewable energy	Rubin 5.6.2-5.8	
	Fri	Oct 6	<b>Lab session: midterm exam review</b>		HW 3 due
7	Mon	Oct 9	Green buildings	TBD	
	Wed	Oct 11	LEED (guest speaker: Arman Shehabi)		
	Fri	Oct 13	<b>Lab session: midterm exam</b>		
8	Mon	Oct 16	LCA of buildings	Junnila et al. 2006	
	Wed	Oct 18	Water resources and pollution	Rubin 2.4	
	Fri	Oct 20	<b>Lab session: campus co-gen plant field trip (group 1)</b>		
9	Mon	Oct 23	Water treatment	TBD	
	Wed	Oct 25	LCA of water provision (guest speaker: Jennifer Stokes)	Stokes, Horvath 2006	HW 4 due
	Fri	Oct 27	<b>Lab session: campus co-gen plant field trip (group 2)</b>		
10	Mon	Oct 30	Water treatment/Air pollution I	Rubin 2.3	
	Wed	Nov 1	Air pollution II	Rubin 11.1-11.4; 11.6	
	Fri	Nov 3	<b>Lab session : Cadillac desert video</b>		HW 5 due
11	Mon	Nov 6	Global climate change I	Rubin 12.1-12.4	
	Wed	Nov 8	Global climate change II	Rubin 12.5-12.10	
12	Mon	Nov 13	Transportation I (guest speaker: Prof. Tad Patzek)	Berkleyan article	
	Wed	Nov 15	Transportation II	Rubin 3.1-3.4	HW 6 due
13	Mon	Nov 20	Transportation III		
	Wed	Nov 22	Wastes and recycling	Rubin 2.5	
14	Mon	Nov 27	Wastes and recycling; Consumption		HW 7 due
	Wed	Nov 29	Consumption		
	Fri	Dec 1	<b>Lab session: fuel cell vehicle field trip</b>		
15	Mon	Dec 4	Risk assessment and decision analysis	Rubin 14.1-14.11	HW 8 due
	Wed	Dec 6	Summary		
	Fri	Dec 8	<b>Lab session: final exam review</b>		
	Tue	Dec 12	<b>Final exam, 12:30-3:30 p.m. (4 Le Conte)</b>		